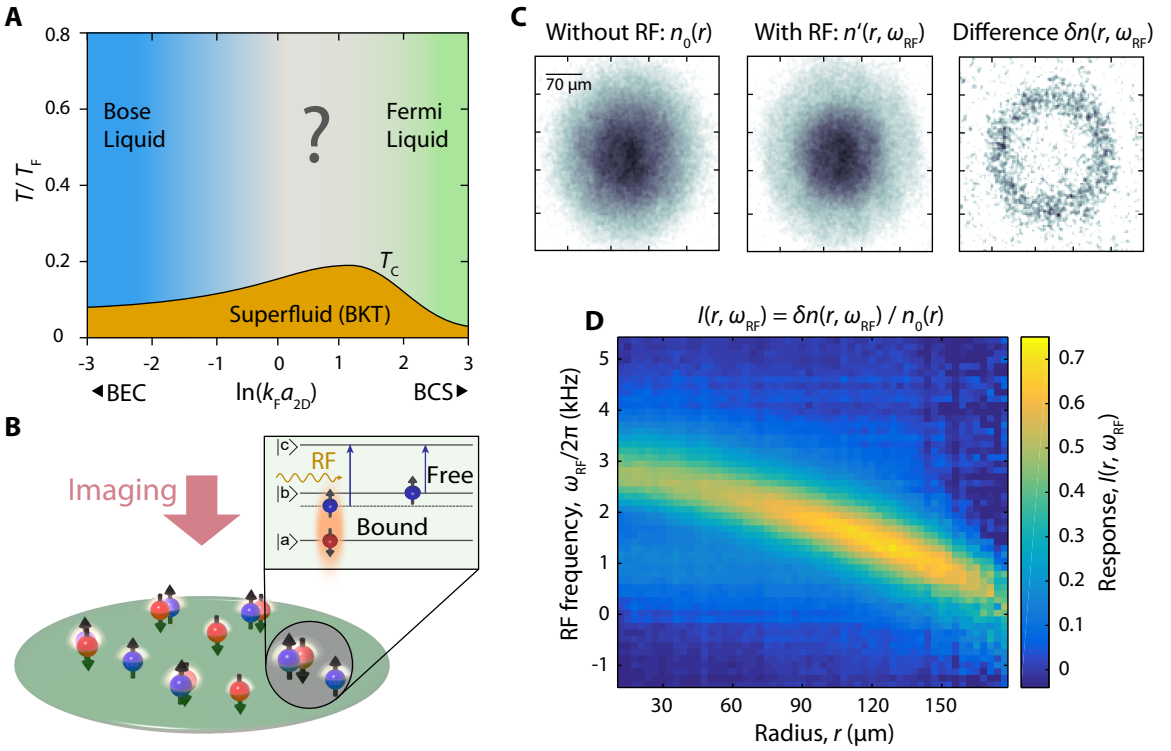
# High temperature pairing in a strongly interacting two-dimensional Fermi gas

**Selim Jochim**

Heidelberg University

We will report on our observation of many-body pairing in a two-dimensional gas of ultracold fermionic atoms at temperatures far above the critical temperature for superfluidity. For this, we use spatially resolved (Figure part C) radio-frequency spectroscopy to measure pairing energies (Figure part B) spanning a wide range of temperatures and interaction strengths. In the strongly interacting regime where the scattering length between fermions is on the same order as the inter-particle spacing, the pairing energy in the normal phase significantly exceeds the intrinsic two-body binding energy of the system and shows a clear dependence on local density (Figure part D). This implies that pairing in this regime is driven by many-body correlations, rather than two-body physics. We find this effect to persist at temperatures close to the Fermi temperature which demonstrates that pairing correlations in strongly interacting two-dimensional fermionic systems are remarkably robust against thermal fluctuations. [1]

We will also give a short summary on our quest for a precision measurements of collective modes. Our current results support the observation of a quantum anomaly due to interactions breaking the scale invariance of the two-dimensional gas.




[1] P. A. Murthy, M. Neidig, R. Klemt, L. Bayha, I. Boettcher, T. Enss, M. Holten, G. Zürn, P.M. Preiss, S. Jochim, **https://arxiv.org/abs/1705.10577**